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CREATION OF OPTIMUM CONDITIONS FOR EXPLORATION, EXPLOIRATION, DISTRIBUTION AND USE OF HYDROCARBONS IN NEGERIA AND CONGO

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I. INTRODUCTION

1. It is evident that hydrocarbons (oil and natural gas) will remain the basic components of the energy balance in the majority of African countries till the end of this century.

2. There is a growing awareness on the part of African oil producing countries, multinational oil companies and financial institutions that existing oil and gas reserves must be developed and the discovery of potential new reserves must also go ahead. There has been a wellcome move toward greater realism on all sides, borne of the common understanding that despite the current lull in oil market, hard work needs to be done in Africa to secure energy resources over the long term.

3. It is in the interest of African member States to encourage petroleum exploration, given the projected climb in their consumption - perhaps a doubling by the year 2000 - as they move further along the path of economic development (with population growth, increasing urbanization and, in many sub-saharan countries, diminishing supplies of traditional or non-commercial sources of energy). It is in the interest of the Africa's economy as a whole to provide an adequate supply of energy.

4. Oil and gas exploration and development are capital-intensive activities which require expertise not currently available to most African countries. However the studies undertaken by the ECA secretariat have indicated that a number of African countries have not been receiving the amount of exploration that would be warranted by their geological potential.

5. In response to the need of exploration efforts in Africa the World Bank has designed and implemented a number of exploration projects. The rationale for these projects is to help the African countries design an exploration strategy and systematically scan the market to attract exploration capital from oil companies at reasonable terms.

6. Since 1979, 13 projects for about US$ 100 million have been financed in Africa and all of those that have reached the stage of production have resulted in positive outcomes, i.e. the signature of one or more exploration/production agreements. There are however areas which despite promotional efforts will not elicit interest from private industry, although they may be of interest to the host country (gas prone areas for example). The World Bank has in such cases financed exploration projects on behalf of governments or national oil companies (e.g. in Egypt, Morocco and Tanzania). All of these projects have resulted in discoveries, mostly gas, which should justify commercial development and have contributed to renewing the interest of international oil companies in the area.

7. Historically for the oil-importing African countries, petroleum exploration and development was a straight forward problem of import substitution - substituting imports of oil, which have become expensive with cheaper domestic production. Although there was always some exploration going on in most African countries even during the years of low oil prices, interest was greately spurred on after oil prices began to rise in the seventies, under the pressure of sustained rates of high growth in the Africa's demand for energy that increase wide surge in exploration and development.

8. In Africa, major efforts were undertaken in Algeria, Angola, Egypt, Libya and Nigeria which were already substantial producers and have been able through intensive exploration and drilling programme to increase their production several-fold. Some of the African countries produced very little or nothing that time (Benin, Cameroon, Congo, Ghana, Ivory Coast and Zaire).

9. However, oil exploration ventures in some African countries without an established oil industry represented a long-term commitments. For instance the first oil exploration well in Chad was drilled in 1973 and now the operators are working on the twenty-second exploration well. So far not one drop of oil has reached the market and inevitably it will be some years before it happens.

10. The similar story happen to the Sudan where since 1977 more than 50 exploration wells have been drilled but not a single barrel of oil was produced. In this case the available infrastructure should be greatly improved before the commercial production of oil could be realized.

11. To the contrary in 1984 Gabon announced a major improvement in its economy which could be attributed to almost total dependence on oil production and export. Total oil industry turn-over in 1984 increased by 23.6 per cent boosting Gross Domestic Product to US$ 2.3 billion.

12. Oil and gas producing African countries could be broadly classified into net oil-exporting and oil-importing (Table 1). Among sub-saharan member States for the purpose of this study two countries have been selected, one major exporter (Nigeria) and one minor exporter (Congo), the first being a member of OPEC and the second - independent African producer.

Table 1

African countries - oil and gas producing.

Oil Exporting	North Africa	Sub-Saharan Africa
High income	Libya	
Middle income		
- major exporters	Algeria	Nigeria
- minor exporters	Egypt	Angola
	Tunisia	Cameroon
		Congo
		Gabon
Oil Importing		
- Medium producers		Ivory Coast
		Zaire
		Benin
		Ghana

Source: Petroleum exploration and development trends in the developing countries, IESA/P/SYMP/TP/8, UN Symposium on financing of petroleum exploration and development in developing countries, Athens, Greece, 22-27 April 1985 (modified). The underlined countries have been selected for this study by the ECA secretariat.

II. HYDROCARBONS IN AFRICA: DEVELOPMENTS IN RESOURCES, PRODUCTION AND CONSUMPTION

(a) Resources

13. Reserves of oil and natural gas in Africa constitute a great share of the World resources. In real figures they are estimated as follows: 57.8 billion barrels of crude oil and 189,423 billion cubic feet of natural gas (Table 2). Taken as a whole the hydrocarbons are still going to play an important role in the economics of African countries. With this in mind there should be a major regional effort to find and develop additional oil and gas fields. It is especially important that the oil-importing developing countries of Africa build the needed infrastructure to support hydrocarbon exploration and development in Africa.

(b) Production

14. Production of liquids in Africa dropped from 305.5 MTOE in 1980 to 233.3 MTOE in 1983 (Table 3). If the production figures of 1983 are compared to those in 1980 the average drop in production by the major producers (Nigeria, Algeria and Angola) was about 7.0 per cent. In some member States (Cameroon, Egypt and Congo) the production during the same period went up in the range of 10-20 per cent. Production of oil and natural gas in 1983 by countries is shown in Table 4.

Table 2

Estimated proved reserves of oil and natural gas in Africa (as per 1-1-1983)

Country	Oil (1,000 bbl)	Natural Gas (10^9 cu.ft)
Algeria	9,440,000	111,250
Angola	1,635,000	1,470
Cameroon	530,000	4,450
Congo	1,550,000	2,700
Egypt	3,325,000	7,180
Gabon	460,000	485
Ghana	5,400	-
Ivory Coast	110,500	3,040
Libya	21,500,000	21,500
Morocco	290	-
Nigeria	16,750,000	32,400
South Africa	116,500	400
Sudan	400,000	-
Tanzania	-	200
Tunisia	1,860,000	4,300
Zaire	139,000	48
Total	57,821,690	189,423

Source: International Petroleum Encyclopedia, 1983.

Table 3

Production and consumption of oil and gas in Africa
(Quantities in thousand metric tons of oil equivalent)

Year	Primary energy production and consumption				
	Total	Liquids	Percent	Gas	Percent
1980	401 583* 133 598**	305 231 57 577	76.0 43.0	23 795 16 087	6.0 12.0
1981	338 614 139 580	238 166 61 119	70.3 43.8	21 014 13 613	6.0 9.7
1982	338 400 145 847	231 842 61 808	68.5 42.3	28 919 18 861	8.0 12.9
1983	341 918 149 441	233 343 64 702	68.2 43.2	28 400 18 192	8.0 12.2

15. Production of natural gas in Africa stabilized in 1982-1983 (28.4 - 28.9 MTOE) and it registered a slight increase compared to the figures in 1981. As the infrastructure for transporting and distributing gas in African countries is either nonexistent or in the early stages of development, time and capital requirements will constrain the build-up of these systems in 1985-1990.

(c) Consumption

16. Consumption of oil in Africa in 1980 was 57.7 MTOE and it was slightly increased by the year 1983 to 64.7 MTOE.

The oil consumption growth in 1985-1990 will be close to the average figure for the developing countries, e.g. 2.3% per annum. In this span of time oil demand in the region may reach 500 MTOE and about half of this amount of oil will be consumed by four African member States that is Algeria, Egypt, Libya and Nigeria.

17. Back in 1980 the report to the joint OAU/ECA meeting of African experts on energy held in Addis Ababa stated (para 214 and para 221). "This new situation makes any long-term forecasting of world petroleum production difficult. However, the view may be taken that Africa, except in the case of Algeria and Libyan Arab Jamahiriya will be affected, only by what may be considered as the acceptable technical limit under current exploitation conditions and by what is in most cases, the fairly restrained eagerness of the new producing countries.

Source: 1983, United Nations Energy Statistics Yearbook.
* Production
** Consumption

The rate of growth recorded so far, in fact, would not appear to give a good indication of future trends, even for the OPEC member countries. It seems unlikely that maximum crude oil production of African countries will ever exceed the limit of 452 million tons by the year 2000; on this basis proven reserves and those yet to be discovered would be sufficient for less than 65 years".

Table 4

Production and export of oil and production of natural gas in Africa in 1983

Country	Oil, million ton			Natural Gas, billion cubic meter
	Production 1983	Export 1983	Production 1984 (Preliminary)	
Algeria	34.2* / 31.3**	13.5	n.a	23.2
Angola	8.7 / 9.1	n.a	12.5	0.23
Cameroon	5.9 / 6.2	5.0	8.0	-
Congo	4.7 / 5.4	4.8	6.0	n.a
Egypt	34.5 / n.a	n.a	n.a	2.4
Gabon	7.5 / 7.9	6.7	8.8	0.1
Libya	51.0 / n.a	n.a	n.a	4.3
Morocco	n.a	n.a	n.a	0.1
Nigeria	61.6 / 62.1	53.0	70.0	1.9
Tunisia	5.7 / 5.3	3.9	5.5	0.4
Zaire	1.3 / 1.3	1.2	1.6	-
Ivory Coast	1.2 / 1.0	n.a	1.1	-

Sources: * International Petroleum Encyclopedia, 1984
** La Lettre Afrique énergie June, 1985

"It is thus very difficult to make any realistic projection of African crude oil production for the year 2000, especially if the maximum annual production of 452 million tons is taken into account. The following hypothesis as to probable future developments may perhaps, however, be adopted (rates as percentages and production in millions of tons):

Period	Annual Average rate of growth	Production at the end of the period	Cumulative production by period
1980-1985	2.5	355.4	1 692.2
1985-1990	1.8	388.6	1 875.3
1990-2000	1.5	451.6	4 221.5

The average annual rate of growth in 20 years'time would be 1.8 per cent."

18. It is of interest to note, that in 1983 actual oil production in Africa reached 233.3 million tons. Preliminary data showed that oil production in 1984 was about 240.0 million tons and it could be expected that by the end of 1985 oil production will be within the same figure. Thus, there is a deficit of about 100,0 million tons of oil unproduced by African countries because of the number of reasons.

19. If the case of Nigeria is taken it could be clearly seen that the problems in exploration programmes in this country stem dirctly from the oil glut and OPEC inability to produce a co-ordinated pricing and production policy. For the last three years the Nigerian oil output has been up and down. By contrast oil production in the Congo grew steadily which reflected greatly increased petroleum export.

20. For the majority of African member States incapacitated by the high cost of oil imports in petroleum exploration programme, remains an absolute priority and an energy policy should be designed therefore in appropriate way, taking this priority into account.

III. EXPLORATION, EXPLOITATION, DISTRIBUTION AND USE OF HYDROCARBONS IN NIGERIA

(a) Exploration and exploitation

21. During the last thirty years Nigeria has emerged from the position of a virtual non-producer in 1958 to that of the sixth largest oil producer in the World today and producer number one in Africa.

The role of the Nigerian oil in the total world energy supply system can be assessed in terms of the nation's reserves and production level. With proved reserves of 16.7 BBLS of oil (and 115 BBLS of potential oil reserves) Nigeria controls about 30 per cent of Africa's reserves and 3.2 per cent of the entire world proved reserves. It also has been estimated that Nigeria's gas potential is enormous probably exceeded only by the USSR and Iran.

22. The major geological feature in Western Africa is Gulf of Guinea basin, shared by Nigeria, Benin, Togo, Ghana and Ivory Coast. The most of its area (810,000 sq. km.) is located offshore (710,000 sq. km.) particularly in the west with the remaining onshore, concentrated in the Niger delta. The thickness of its sedimentary cover exceeds 10,000 m. and is being composed of Mesozoic and Tertiary deposits, both producing either oil or gas. The exploration of this basin began in 1951 in the Delta Basin (Nigeria) and extended during the last 10 years westward resulting in new discoveries off the Ivory Coast, Ghana and Benin coast.

23. With a view to facilitating the presentation of the Gulf of Guinea basin, it was artificially split in two sectors: eastern, confined mostly to Niger Delta in Nigeria and, western sector which includes Ivory Coast, Ghana, Togo and Benin oil and gas fields.

24. The eastern sector which includes Delta Basin has been intensively explored during the last 30 years and counts over 150 oil and/or gas producing fields. The major producing formation is Tertiary's Agbada Formation (oligocene-Miocene) at depths varying from 1220 m. (Apoi oil and gas field) to 4056 m. (Tebidaba oil field). The oil fields discovered in the Niger Delta (onshore and offshore) are located in the flat top and gentle slopes of anticlines of a "roll-over" type (connected to the down flank of the growth faults, which are generally small in size (6-10 km. long and 3-5 km. wide), oriented almost parallel to the former border of the delta. Hydrocarbons were also discovered in the lower sands of the Benin formation and in some lenses of sand of the Akata formation (Focene). The northern border of the Delta basin, with Cretaceous deposits as objective has also been explored and oil and gas fields were discovered as a result, but smaller in size than those of the Agbada formation.

25. At the end of 1981, proved recoverable oil reserves on land and offshore in the Niger River Delta, were calculated at about 1.37 billion tonnes. Undiscovered, recoverable oil reserves were estimated to be about 1.1 billion tonnes. During the same year, Nigeria produced 71.2 million tons of crude, retaining thus the first place in Africa. Oil production in 1984 was about 70.0 million tons.

26. Most of the Nigerian reserves of gas are concentrated in the Niger Delta. According to international sources some 85 trillion cubic feet of gas are proved,

and another 65 trillion cubic feet remain in the category of undiscovered recoverable reserves. Of the total proved reserves, about 70% are located on land. About half of the proved reserves are associated gas and of these about 75% exist as gas cap. Gas occurs in a large number of small, widely scattered reservoirs, the average reserves per field being about 210 billion cubic feet for non-associated gas, and 170 billion cubic feet for associated gas. Of the non-associated gas reserves, only about 17% are located in fields with reserves larger than one trillion cubic feet. Other sources in Nigeria indicated that although at present, no deliberate attempt has been made to explore for natural gas, Nigeria's natural gas reserves are believed to be in the range of 90 trillion and 140 trillion cu. ft. To date, gas discovery has only been incidental to the search for oil, and, in all, 1.5 million cu. ft. per day of gas is currently produced, a greater percentage of which is flared. Exploration for gas is likely to gain in importance as domestic gas utilization expands and as government presses ahead with the implementation of Liquified Natural Gas (LNG) project.

27. Development activities in Nigeria looked promising at the end of the seventies when the Nigerian National Petroleum Corporation (NNPC) opened all unallocated license areas for exploratory work under its new relationship terms with foreign operators. The Corporation formally invited "technically and financially competent oil companies" to express their interest in prequalification procedures for service contracts. Blocks in the Niger Delta frame, Anambra, Benue, Bida and Solco basins and in the Chad basin were among those offered.

28. Later on Nigeria has made some moves in the direction of increasing ownership of oil resources. As a result of these moves, Nigeria's overall equity participation interest in oil companies now averages some 71 per cent. This entitles Nigeria to a greater percentage of equity oil as well as imposes on the country an equal percentage of equity involvement in oil investment. Furthermore, the government has in place an adequate institutional framework to monitor its interests.

(b) Distribution and use

29. In order to facilitate oil production in Nigeria a group of offshore oil fields were connected through a gathering system of field pipelines: Okoro, Idoho, Usari, Tasabo, Ekpe, Etim, Inin, Ubit C, Ubit B and Utne. All these fields have their production collected at Idoho field and then transported through a pipeline to the Qua Iboe Terminal. In Nigeria east of Port Harcourt, there is another system of pipelines which collects the production to the Bony terminal and partly to the Port Harcourt refinery. From Port Harcourt there is a 12-inch pipeline to Enugu town, via Aba Town, and further, a 6-inch pipeline to Makundi. Further to the North, a 16-inch pipeline comes from Warri area in the Niger Delta to Kaduna refinery and from Kaduna a 10-inch pipeline goes to Jos. Between Jos and Maidiguri there is a 6-inch pipeline securing supply to the Northern Nigeria and partially to Chad. A gas pipeline is planned to connect Bony terminal with Calabar and to supply Oron Power station and Onne Fertilizer Plant.

30. The biggest Nigerian refinery is located in Kaduna, it went onstream in 1980 and had a capacity of 5 million tons of crude per year. This capacity is not fully in operation because crude oil receiving facilities are not yet completed.

31. In Nigeria, few non-associated gas fields have yet been exploited. On the other hand, about 60% of the associated gas fields were under production at the end of 1981, and these fields accounted for some 80% of the total associated gas reserves.

32. At the end of 1981, only a small fraction of gas produced was being used for fuel in field operations or reinjected, and the rest was being flared. The total Nigerian gas production in 1981, reached 17 billion cubic metres (485 billion cubic feet, or 1.3 billion cubic feet per day).

33. Concerning the Natural Gas pipeline system, the Niger Delta's gas is transported only to Aladja Delta Steel (for electricity generation) and Ughelli Power Station. There are, however, proposed gas pipelines to connect Warri with Lagos and Warri with Oben. One gas pipe line is under construction (Oben-Ajaokuta) and it is proposed to be continued from Ajaokuta to Abuja. From the gas pipeline under construction between Oben and Lokoja, two branches are proposed to supply Auchi and Onitsha Power Station.

IV. EXPLORATION, EXPLOITATION, DISTRIBUTION AND USE OF HYDROCARBONS IN CONGO

(a) Exploration and exploitation

34. Congo continues to exhibit a high and non-diminishing reliance on oil as a commercial energy source. Equally this is true in case of the economic development, income and investment expenditures. In 1982 investment expenditure was at a level six times higher than the average of the previous five years, a reflection at greatly increased petroleum exports and increased borrowing under a very ambitious five-year plan. However, since the beginning of 1983, the government has undertaken to make deep cuts in the programme as official reestimates, made in early 1983, showed that oil revenues for the year may be 40 per cent lower than had been originally borecast.

35. All exploration and exploitation efforts in the country were concentrated in the Congo basin where the producing formations of Cretaceous, Paleogeue and Neogene age are known. Their total thickness reaches about 7000 m. and has some 13 main oil and gas fields belonging to Congo, Zaire and Angola. Over 300 wells were drilled in this Subbasin which produces from lower and middle Cretaceous deposits. Total production of crude oil in the basin (i.e. Congo, Zaire and Angola's Cabinda), reached in 1981, 7.3 million tons of oil and negligible quantities of natural gas were produced also. Its reserves were estimated at 200 million tons of oil and 58 billion cu. m. of natural gas as of 1 January 1981.

36. The two largest commercial fields in the country are Emeraude and Loango, which are currently producing at a rate of 60,000 b/d. Recently Likouala field came on stream with initial production close to 30,000 b/d. Two more fields are in the process of development, which proved to be the most significant discoveries in the region, these are Sendjo and Yanga.

Offshore oil reserves of the area are estimated at 650 mln bbl in place.

37. Back in 1980 daily crude oil production from the Congo was about 52,000 bbl. In 1984 the Congo produced 6.0 million tons of oil and export figure for 1983 reached 4.8 million tons.

They reported in May 1984 the production peak of 126,000 bbl per day in Congo.

38. Estimated recoverable reserves in Congo by 1984 exceeded 410 MMBBLS and are located almost entirely offshore. It was calculated by Petro-consultants (Geneva) that three-quarters of discovered oil has yet to be extracted and lifespan was put at about 16 years. In the largest oil field Emeraude there is possibility to enhance recoverable reserves provided secondary recovery methods prove to be a success.

39. Gas production in Congo is minor due to a lack of local market for this commodity. At present there are 8 fields proved reserves of which are estimated around 14 billion cubic meters.

(b) Distribution and use

40. A 60-mile, 18-in crude oil line run from Loango to Djeno terminal, near Point Indienne. There is only one refinery in Pointe Noire with a capacity of up to 1.2 million tons.

V. CREATION OF OPTIMUM CONDITIONS FOR EXPLORATION, EXPLOITATION, DISTRIBUTION AND USE OF HYDROCARBONS IN NIGERIA AND CONGO

(a) The Nigerian experience

41. With the formation of the Nigerian National Petroleum Corporation (NNPC) in 1977 the Government has been able to extend its control over the operation of oil companies and itself taking over initiatives in the area of exploration. NNPC is carring out the exploration programmes in the areas which have not been leased out to oil companies and its activities have been mainly offshore and in the Chad basin with some success.

42. In order to create the optimum conditions for petroleum exploration and diversify the risks associated with exploration financing the Government has continued to enter into new forms of participation agreements. For instance in 1973 NNPC, acting on behalf of the Government, signed a production sharing

agreement with Ashland Oil Company. This agreement requires that Ashland set aside up to 50 per cent of production for the recovery of costs and payment of royalties, 55 per cent of the rest is intended to offset the Petroleum Profit Tax, while the balance which is termed profit oil is shared between NNPC and Ashland at the rates of 65/35 per cent for the first 50,000 barreles per day and 70/30 per cent thereafter.

43. For the purpose of optimisation of exploration programmes in 1979 the Government also signed a Risk service contract agreement with Aqip Africa, Elf Aquitaine and Nigues Petroleum. This agreement compels the oil companies to undertake full financial responsibility for exploration, development and production, covering specific blocks. If no oil discovery is made after 5 years of exploration activity, a company forfeits all rights. On the other hand, if oil is discovered the company gets back its investments and enjoys the first option to purchase a fixed quantity of crude produced.

44. Nigeria's determination to create the optimum conditions for development oil industry could be traced back to 1959 when the Petroleum Profit Tax Ordinance was enacted. This act empowered the Government to levy 65.75 per cent tax on oil company profits after production costs had been amortized. Royalty on oil, produced on land was fixed at 20 per cent, and for offshore production (water depth less than 100 m) the figure was 18.5 per cent. However the responses of petroleum producers to these incentives were very dissapointing.

45. The new package of incentives released in 1977 contained the following provisions:

(a) Exploration well costs and those of the first two appraisal wells in each field whether successful or not were to be expensed in the year of drilling;

(b) Approval of annual allowance to companies for the amortisation of their investments in five equal installments;

(c) Reduction of tax imposed on oil companies engaged in exploration but not yet producing to the lowest operating level in all the OPEC member States to 65.75 per cent;

(d) Petroleum operational assets now qualify for investment tax credit for the accounting period in which those assets were first used, according to the new rates.

46. This package of incentives did arouse tremendous interest from oil producing/exploration companies, resulting in intensification of exploration activities. The number of exploration wells drilled rose from 20 in 1976 to 27 in 1977, an increase of 35 per cent. However, it was as from 1978 that the impact of the incentive package in relation to offshore operations became evident. A total of 37 exploration wells drilled in 1978 was made up of 17 offshore wells (45.9%), 13 swampwells (35.1%) and 7 land wells (18.9%).

47. The 17 offshore wells were 3 times the number of offshore exploration wells drilled in 1976 and 1977, respectively. In general, the 37 wells drilled in all locations in 1978 exceeded the total number of wells drilled in 1976. Offshore exploration activities remained predominant throughout the subsequent years (1979-1982) indicating the level and structure of response that could be expected from any deliberate liberalisation of fiscal regimes applicable to the oil sector in a booming oil market. Petroleum Tax incentive Package of 1977 unleashed major exploration successes. Whereas only 3 commercial discoveries were made in 1976, 6, 11, 12 and 15 commercial discoveries were recorded in 1977, 1978, 1979 and 1980 respectively.

48. Among the measures intended to create the optimum conditions for distribution and use of petroleum in Nigeria was the easing of obligations of the companies in regard to domestic use of petroleum. In 1982 the Government absolved oil companies of their obligations to supply a prorata share of the crude requirements for domestic refining out of their equity entitlements at prices considerably less than world prices. Thereafter, the supply of crude oil to domestic refineries was to become the sole responsibility of the NNPC. Previously, the companies had provided some 80 per cent of the 250,000 b/d required for local consumption.

49. However the situation in Nigeria-the largest economy in Sub-Saharan Africa- indicates the gravity of current economic crisis. As indicated in the World Bank Study, in 1983 foreign-exchange earnings, virtually all from oil exports, have fallen dramatically since the end of 1981. Foreign exchange reserves declined in 1982 from a level equivalent to three months'worth of imports to less than three weeks'worth. Investment, equal to about a third of GDP in 1980-81, has been radically reduced, as both foreign exchange and government resources contract (85 per cent of government revenues, both federal and state, are directly generated from oil exports). Imports in 1983 are likely to be reduced to about their 1981 level.

50. GDP that is not accounted for by oil declined about 4 per cent in 1982 and was declining at an even higher rate in the first half of 1983. This decline has also reduced incomes in Togo and Benin because of their dependence on exports to Nigeria, particularly of food and of commodities in transit. As early as April 1982 the Government took a number of emergency measures involving import restrictions and fiscal contraction. The measures have proven insufficient - as the price of oil and the volume of oil exports continued their down-ward course - to restore fiscal and external balance.

51. Medium-term and long-term indebtedness, however, is low; the country, therefore, is likely to borrow heavily in 1983, possibly through some combination of medium-term refinancing from foreign banks of part of the arrears on trade payments, through borrowing from other countries that are members of OPEC and through additional Eurodollar borrowing.

52. The downturn has brought investment program in Nigeria's states to a virtual standstill. Since many projects involving IBRD assistance have shortages of counterpart funding, the pace of project implementation has slowed considerably. The Bank is taking steps to speed up disbursements and to cover a greater proportion of project costs. In addition, a loan of about US$ 250 million to finance the cost of fertilizer imports was at an advanced stage of preparation as fiscal 198[illegible] ended.

53. In order to balance the deleterious effects of economic crisis in October 1984 Nigeria broke with the OPEC price structure, reducing its prices of crude oil by up to two dollars a barrel. Then in February 1985 Nigeria has adapted a two-tier pricing system, apparently to encourage customers to take more of its light-grade crude. According to this arrangement prices for contract customers are increased by between 45 and 65 cents a barrel, while package deal prices go up by between 30 and 65 cents. The full implications of the new system still had to be assessed.

54. At the same time Nigeria has called for greater flexibility and more open acknowledgement of the realities of the oil market by the OPEC. It is a high time for this oil producers group to re-examine its rules on prices and production and adapt th[illegible], where possible, to the needs of individual member countries.

55. The oil industry analysts say that the OPEC have now clearly lost its influence on the world oil market and they predict that the organization is unlikely to regain its former status before 1990.

56. Under these circumstances Nigeria being a low cost producing country (production cost per barrel in dollar terms range between US$ 3.5 and 5.0) can afford the independent way in the development of its national petroleum wealth. However the deteriorating world oil market and consequent decline in oil revenues have now introduced an element of uncertainty in Government budget, compelling drastic economic and financial adjustments including the slowing down of exploration investments and reduction in the size of capital projects in general.

57. Nigeria's dependence on oil is upto 90 per cent in foreign exchange receipts and 70 per cent of budgetary revenues. In view of this, drastic measures undertaken recently by Nigerian government leave no ground for further speculation on the possibility to create additional conditions for exploration, exploiration, distribution and use of hydrocarbons in this country. For a number of reasons this paper does not cover sufficiently the policy issues and the future prospects that may proceed from this analysis. The study of this kind may be undertaken in future.

(b) The Congo experience

58. Petroleum industry in Congo is charaterised by the traditional dominance of foreign operators such as Elf Congo and Agip. Pragmatism in oil policies exercised by the Government has encouraged the corporate oil presence and inspired new entrants to take an exploration risk in the 1980s and the most notable change has been the inflow of US independents who are challenging the traditional partners.

59. The logic of Congo's positive output response to price decline resides in strategic revenue needs, lack of OPEC constraints and monoeconomic survival requirements.

60. Cumulative total petroleum investments to 1984 have exceeded CFA 700 billion. Congo will seek to encourage US oil investors within a framework of industry control exercised by State-owned Hydro-Congo. The latter has equity positions in most permits. Even so, Elf-Congo will remain as market Leader both upstream and downstream even though the parent company has turned its eyes south to Angola and now has strategic holdings in the US.

61. For all the expected activity, Congo faces an eventual oil downturn in the 1990s, possibly before, if new discoveries are not soon made. This provides an underlying pressure to encourage exploration. Hence, most of the shelf (93%) is leased as is a similar share of deep water acreage. Acreage reductions are foreseen for deepwater next year (1'631 sq.km) as well as eventually the shelf (2'690 sq.km) in 1987, with another 2'400 sq.km in both by 1990.

62. By 1990, exploration wells should reach 34 (over double current levels) and development wells 68, well up on 14 achieved 10 years earlier. Mobile rig levels are expected to double to 15 by this time.

63. Gross domescic product growth will be low but positive in the rest of the 1980s while inflation is still problematic (18-20%). Optimistic plan targets (1981-86), already scaled down more than once, will be difficult to achieve as per schedule. The fiscal position is under continual stress and over 32% of funds go for debt service (49% of oil revenues). Debt service ratio is already 25% on exports and reserves have weakened over 1982-84, so requiring re-building. Rescheduling cannot be excluded. In sum the medium-term holds several uncertainties.

64. In a major country risk evaluation, Petroconsultants (Geneva) indicated that oil is responsible for 31% GDP, 89% exports, 27% intermediate consumption, 27% of value-added, 67% of tax revenue, 40% of fixed investment and 53% of net profits. No relaxation in this critical all-encompassing role is foreseen. The "post-petroleum economy", much discussed in policy circles, remains as elusive as ever.

65. The Congo among other producing member States in Western Africa has entered an oil phase which will become increasingly important in volume and impact at the end of the eighties despite expected soft crude prices. This zone's balance with sub-saharan Africa's largest producer, OPEC-member Nigeria,

will similarly be enhanced in terms of the corporate presence, additional acreage opened, exploration activity, wildcats drilled, development wells and output levels.

66. Anticipated macro trends foreseen for Nigeria and Congo include a higher dependence on oil revenues in two countries - for both foreign exchange and tax receipts. With the medium-term market outlook, this is more likely than not to lead to better exploration terms for oil companies since, if nothingelse, Nigeria and Congo will probably exhibit a continued "output - maximisation" behaviour. So, while dramatic developments could not be predicted, a steady shift towards a more attractive industry scale is confidently expected.

VI. CONCLUSION

67. Owing to the heterogeneity of Africa, only case by case studies can give a fairly complete picture of the conditions which exsit in the country for exploration, exploitation, distribution and use of hydrocarbons. The purpose of this technical publication was to give a general overview of the petroleum programmes in Nigeria and Congo in order to identify the optimum conditions for development of hydrocarbons in these countries.

68. It is evident that production of oil and natural gas will remain the basic component of economic development in Nigeria and Congo. Existing oil and gas reserves must be developed and the discovery of potential new reserves must also go ahead, so it is in the interest of both countries to encourage the programmes leading to the creation of optimum conditions for exploration, exploitation, distribution and use of hydrocarbons.

69. This factor has an important effect on the level of petroleum exploration, exploitation and production in Nigeria for two main reasons. First, the glut of oil and the restrictions imposed by OPEC on the assumption that the glut will last a long time has discouraged exploration programmes. Second, the relatively depressed state of oil markets has adversely affected oil companies earnings and they have had to trim their costs drastically.

70. The present lull and relative lack of interest in petroleum activity in Nigeria and Congo is unlikely to last long. The majority of short-term forecasts show that demand for oil in the world will rise slowly over next five years, 1985-1990 between 1.8 and 2.3 per cent per annum. If this scenario is correct, there is little doubt that oil companies will once again, begin to intensify their efforts in Nigeria and Congo. In the meantime, there are a number of things that can be done by the Governments of these African States to quicken the pace of exploration, exploitation and development of oil fields.

71. Since Nigeria and Congo will continue to depend on export of oil for sometime to come it is worthwhile therefore to intensify the search for hydrocarbons. Additionally, conservation measures should be stepped up in order to save some oil for domestic consumption.

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INVENTORY AND ASSESSMENT OF HYDROCARBON POTENTIAL FOR SOME MEMBER STATES OF THE EAST AND SOUTHERN AFRICAN SUBREGION AND CENTRAL AFRICAN SUBREGION

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I. INTRODUCTION

1. It is evident that oil and natural gas will remain the basic components of the energy mix in the majority of African countries till the end of this century. Hence an attempt to explore for domestic hydrocarbon reserves in some member States of the East and South African Subregion and Central African Subregion is explained by the need for self-sufficiency in energy production.

2. Although there was always some exploration going on in most African countries even during the years of low oil prices, interest was greately spurred on after oil prices began to rise in the seventies, under the pressure of sustained rates of high growth in Africa's demand for energy that increased wide surge in exploration and development.

3. This publication gives an overview of petroleum geology and hydrocarbon potential of some member States of the East and South African Subregion and Central African Subregion. The aim of the publication is to show the state of the art in petroleum exploration in each subregion and to try to define a strategy and a plan for the development and utilization of hydrocarbon resources in this subregion.

4. The publication is based on the desk study carried out in the secretariat of the United Nations Economic Commission for Africa and on the data collected during the missions undertaken by ECA Staff in 1984-85 to Tanzania, Zambia, Mozambique and Congo. The emphasis is laid on exploration programmes for hydrocarbons undertaken by the respective Governments.

5. In each subregion four countries have been selected for this study. Among those are non-producers such as all four countries in East Africa (Ethiopia, Somalia, Kenya and Uganda), Tanzania, Zambia and Mozambique in South Africa and Rwanda in Central Africa. There are also case studies of minor oil exporters like Angola in South Africa and Cameroon and Congo in Central Africa. One of the countries (Zaire) is oil-importing medium producer of petroleum.

6. Oil and natural gas exploration and development are capital-intensive activities which require expertise not currently available to most African countries. Hence as a responce to the need of exploration efforts, the Government of the countries in East, South and Central African subregions in co-operation with UNDP, World Bank and bilateral donors have designed and implemented a number of exploration projects. The rationale for these projects was to help African countries to design an exploration strategy and systematically scan the international market in order to attract exploration capital from oil companies at reasonable terms.

7. There is a growing awareness on the part of African oil producing countries, multinational oil companies and financial institutions that existing oil and gas reserves must be developed and the discovery of potential new reserves must also go ahead. There has been a welcome move towards greater realism on all sides borne of the common understanding that despite the current lull in oil market, hard work needs to be done in Africa to secure hydrocarbon resources over the long term. It is in the interest of African member States to encourage petroleum

exploration, given the projected climb in their consumption - perhaps a doubling by the year 2000 - as they move further along the path of economic development (with population growth, increasing urbanization and, in many subsaharan countries, diminishing supplies of traditional or non-commercial sources of energy). It is in the interest of the Africa's economy as whole to provide an adequate supply of energy.

8. In this publication, an attempt was made to present general inventory and assessment of hydrocarbon potential for some member States at the various stage of the development of hydrocarbon's resource. The assessment is given in this paper is derived primarily from regional geological considerations, and, as in any dynamic process are subject to considerable change with time and application of new geologic data and techniques.

II. PETROLEUM GEOLOGY AND ASSESSMENT OF HYDROCARBON POTENTIAL

(a) East Africa

9. The East African sedimentary basin as a whole covers about 2 million sq. km half of which is located offshore. There is a sedimentary accumulation of great thickness registered in two places in this basin. That is in the Lower Tana River basin including the adjacent territory of Somalia (upto 9,000 m) and in another area along the axis of the trough down south. The exploratory effort spent in the East African basin includes about 120 wells which have been drilled over the past years with moderate results.

(i) Ethiopia

10. The exploration programmes for hydrocarbons in Ethiopia were concentrated in two areas that is in the Red sea basin and in the Ogaden basin. So far one gas field of commercial value has been discovered. In the Calub field Permian-Triassic sediments are gas-bearing and a gas pool is located at the depth around 3,600 m. Oil and gas showings have also been reported from the covering Cretaceous deposits. This field is considered of medium size and it contains between 5 and 50 billion of natural gas. An extensive exploratory programme is now underway in the Ogaden basin and recently a discovery of another commercial gas field was reported.

11. Some portion of Ethiopia and Sudan belong to the Red sea basin, which has a total area of 370,000 sq. km and is located mostly offshore. It contains deposits of Paleogene-Neogene age up to 5,000 m thick offshore Massawa and Port Sudan. Both Sudan and Ethiopia are engaged in the exploration programmes in this basin but no commercial discovery has been made.

12. Ethiopia started exploration of the Red Sea basin in the Dahlak archipelago back in 1921 on the evidence of some oil seepages, probably located along some faulted zone. Ten shallow wells and three deep probes have been drilled before the Second World War and drilling operations were resumed in 1963 when five exploratory wells were completed. At least four of the above mentioned wells have had oil showings, one gas showing and in one well a gas blow-out happened severely damaging the well.

13. It is of interest to mention the developments in the oil exploration programme is the Red sea basin undertaken by the Sudan. They started exploration in the Red sea basin in 1958 and since then nine wells have been drilled, of which six are located in the Tokar Delta region, south of Suakin. Only three wells have tested gas and one of these was apparently non-commercial. The second was a wet gas discovery and the third was again non-commercial.

14. Based on these data and on geophysical evidence they calculated the reserves at Suakin at about 11 billion cu.m of gas and 4.0 million tons of condensate. The gas has a high heating value and no sulfur, which makes it an excellent fuel. Additional drilling here is required in order to confirm the preliminary figures of the reserves. There are two smaller structures in the area which may be worthy of drilling if Suakin structure turned out to be a commercial find after one or two additional wells drilled.

(ii) Somalia

15. The petroleum exploration programmes in Somalia have started back in 1950. At that time about 12 test wells were drilled combined with surface geophysics. As a result it was established that Somalia possesses all the requirements for being called a petroliferous province. Hydrocarbons have been generated in Triassic, Gretacesus and Tertiary rocks and the total thickness of sedimentary cover amounts to about 9,000 m. Many porous and permeable reservoirs are known both in carbonate and clastic sequences and various traps for hydrocarbons should be present in the territory.

(iii) Kenya

16. So far, Kenya did not identify reserves of oil or natural gas. However the sedimentary basins have not been properly explored and potential still exists for future discoveries. Data from exploration in Kenya and neighbouring countries indicate that oil and gas have been generated and that there are abandant source rocks and prospective reservoirs. Exploration efforts in the past have been held back because the structures are small and offshore shelf area is limited. The prospects for finding gas are higher than for oil. At present the value of gas is increasing, potential gas discoveries are less of a deterrent to exploration.

17. The Kenya Government has received some proposals for offshore exploration and many requests concerning contract possibilitees. The World Bank has approved a US$ 4 million loan to provide technical assistance in petroleum exploration promotion and for legal consultants, in order to evaluate the existing data and to attract private investment for exploration. These efforts are crucial to the long term energy prospects of the country.

(iv) Uganda

18. The most promising area in Uganda from the view point of petroleum possibilities is the Western Rift Valley, in particular Lake Albert. The rest of the country appears to be of little interest. Oil seepages along the faults in the Rift Valley have been known for a long time and their presence induced interest in exploration. About 20 shallow wells were drilled here and one deep

well to the depth of 1,200 m. Oil showings were found in one well and the deep well identified oil sand and numerous black shales. In 1956 the drilling operations were stopped, however interest in the petroleum prospects of the Lake Albert area continued.

19. The analysis of Uganda's geology and petroleum prospects revealed that the thickness of sedimentary cover could be as much as 4,000 m in the Lake Albert area, and this situation is rather favourable for petroleum generation. However, in the one deep well drilled the thickness of sediments was only 1,200 m. However this well was drilled close to the edge of the basin near the fault. In conclusion, the Western Rift Valley appears to be interesting for further exploration, and the next objective of exploration should be the determination of the thickness of the sediments in the Rift Valley.

20. Co-operation between Uganda and other countries in the subregion is an important prerequisite for further exploration work. The border between Uganda and Zaire runs through Lake Albert, and the entire Lake area has to be surveyed in order to get meaningful geological information. Similarly, co-operation with Tanzania and Kenya is required to complete surveys in the Southern portion of the Rift Valley and Lake Victoria. It is therefore encouraging to note that these four countries have recently agreed to participate in a joint air magnetic survey of these areas and to share the costs and results of this exercise.

(b) Southern Africa

21. From the geological point of view the East African basin is extended into South African territory and there is the trough from Dar-es-Salaam to Mtwara on the coast at the Tanzania-Mozambique border filled in by sedimentary sequence about 9,000 m thick.

22. Down south there is the Mozambican basin which as a whole covers 720,000 sq. km out of that about 470,000 are offshore. In the northern portion of the basin the sedimentary cover is about 7,000 m but in the central part it comes to 9,000 m. In this part of the basin, south of Beira, three commercial gas fields have been discovered on shore.

(i) Tanzania

23. Tanzania has to import roughly 700-800,000 tons of oil and 200-300,000 tons of refined products, and as a result the country suffers from heavy drain of foreign exchange. Hence the Tanzania Petroleum Corporation is very keen to explore and produce petroleum and the programme of exploration on land and off-shore has revealed the Songo Songo gas field and recently the Kimbiji discovery was made. There is an extensive drilling programme being undertaken by some foreign contractors such as Royal Dutch Shell (2 wells in 1984) and International Energy Development Corporation (2 wells in 1984-1985).

24. Activities financed by the World Bank in 1983 in gas exploration in the Songo Songo field area have resulted in gas findings to date that have far exceeded earlier expectations (about 500 billion cubic feet). Proven reserves

are now established, which could satisfy the equivalent of sixty-five to seventy five years of electricity consumption at existing levels.

(ii) Zambia

25. Zambia heavily relies on import of crude and petroleum products, hence the Geological Survey of Zambia places the emphasis on the evaluation of hydrocarbon potential of the country. Within Zambia at least seven sedimentary basins have been delineated favourable for petroleum prospection. The exploration work here has started with airborne gravity and magnetic survey and upon completion of seismic work the exploratory drilling is envisaged. From the geological view point this programme is justified and its successful implementation may bring rewarding results.

(iii) Mozambique

26. Mozambique is carring out the extensive programme of petroleum exploration both on land and offshore, and as a result some gas fields have been discovered. The Buzi field discovered in 1962 with gas at depth of 1450-1471 m in the middle of Cretaceous deposits, the Pande field discovered in 1961 with gas at depth of 1100-1600 m in Cretaceous sediments and finally the Temane field, discovered in 1957 with gas at depths of 1295-1300 m in Cretaceous deposits. The Pande field is considered a medium-sized field, whereas the other two are small-sized fields. Currently, the three fields are not exploited. For the exploration of the Mozambican basin close to 75 wells were drilled. However only 12 wells have been drilled throughout the shelf area and there has been no drilling since 1974.

27. At present two foreign companies have been granted a production sharing contract to explore Mozambique's onshore Rovuma Basin, covering about 5,000 sq. miles. The total commitment of companies, covering a maximum of 7 years, has been valued at US$ 60 million. The Rovuma basin is situated in North-Eastern Mozambique, immediately south of its border with Tanzania. Meanwhile Mozambique is seeking to boost an interest in its continental shelf, all of which is open for bidding.

(iv) Angola

28. Angola is one of the middle income minor exporters of oil in Africa. Estimated proved reserves of oil and natural gas in Angola (as per 1-1-1983) is 1635 million barrels of oil and 1470 billion cubic feet of natural gas. According to a recent evaluation by Petroconsultants (Geneva), estimated remaining recoverable reserves are put at over 1109 million barrels, 86 per cent of which is found offshore.

29. Production of oil in 1983 in Angola was between 8.7 and 9.1 million tons and production of natural gas was about 0.23 billion cubic meters. Oil accounts for 98 per cent of Angola's commercial energy production, 25 per cent of GDP, 84 per cent of its exports and 70 per cent of state revenues. Oil also forms the largest share of external investments and annual investments in petroleum now run at about US$ 550-600 million and it is expected that the level will continue to rise through the forthcoming decade.

30. In Angola since 1981 at least 15 fields have been discovered, all but two located outside Cabinda. The average size of the field is about 90 million barrels of oil, but the fields offshore are usually twice that large. Proved reserves of natural gas amount to 34 trillion cubic feet, and 67 per cent of this amount account for associated gas. They use at present only 10 per cent of the gas produced and the rest is flared.

31. Production of crude oil in Angola peaked at the end of 1983, when 200,000 b/day level was reached and in August, 1984 the output peaked 218,000 b/day. Angola is expected to remain a steedy minor producer in Africa in the future. There are plans to drill about 19 exploratory wells in 1985 and increase the number of development wells to 41 during 1986-88. Petroleum output growth will be concentrated in offshore fields and it is expected that nearly 20 per cent of crude expansion in the future will flow from new discoveries.

(c) Central Africa

(i) Rwanda

32. This country is famous for its methane production from the water in the Kivu Lake. Total reserves of gas dissolved in the water of the Kivu Lake are estimated around 57 billion cubic meters, and the share of Rwanda comes to 23 billion cubic meters. The sedimentary basin which embraces both Rwanda and Burundi has not been seriously considered before the last two years. There is a possibility thet petroleum exploration in the two countries could result in the discovery of a number of small oil and/or gas fields.

(ii) Zaire

33. Zaire is classified as oil importing medium producer, estimated proved reserves of oil and natural gas are 139 million barrels and 48 billion cubic feet respectively. There are reserves of methane gas in the Kivu Lake which are calculated at 34 billion cubic meters.

34. In 1983 oil production in Zaire reached 1.3 million tons, out of which export share came to 1.2 million tons. Preliminary data for 1984 showed a slight increase in production to 1.6 million tons.

35. In Zaire there is one refinery (Moanda) with a capacity of 1.75 million tons per year and a petroleum products pipeline connects Moanda with Kinshasa.

(iii) Cameroon

36. In the list of oil and gas producing African member States Cameroon is classified as middle income minor exporter. Cameroon's place on the oil map of Africa has largely been earned since the late seventies. From 1981 it has been a net oil exporter with over 90% of commercial energy from hydrocarbons.

37. In 1983 Cameroon produced between 5.9 and 6.2 million tons out of which 5.0 million tons have been exported. Preliminary figure of production in 1984 estimated around 8.0 million tons.

38. Petroconsultants (Geneva) estimated recoverable oil reserves of oil in Cameroon at around 530 million barrels all located offshore and that is enough for 17 years at the current production rate of 152,000 b/day. However in 1981-84 there were at least 11 new oil discoveries, and these reserves are not included into the estimates given above.

(iv) Congo

39. Congo, like Cameroon, in the list of oil and gas producing African member States is classified as middle income minor exporter.

40. All exploration and exploitation efforts in the country were concentrated in the Congo basin where the producing formations are of Cretaceous, Paleogene and Neogene age are known. Their total thickness reaches about 7,000m and has some 13 main oil and gas fields belonging to Congo, Zaire and Angola. Over 300 wells were drilled in this Subbasin which produces from lower and middle cretaceous deposits. Total production of crude oil in the basin (i.e. Congo, Zaire and Angola's Cabinda), reached in 1981, 7.3 million tons of oil and negligible quantities of natural gas were produced also. Its reserves were estimated at 200 million tons of oil and 58 billion cu.m. of natural gas as of 1 January 1981.

41. The two largest commercial fields in the country are Emeraude and Loango, which are currently producing at a rate of 60,000 b/d. Recently Likouala field came on stream with initial production close to 30,000 b/d. Two more fields are in the process of development, which proved to be the most significant discoverces in the region these are Sendjo and Yanga.

Offshore oil reserves of the area are estimated at 650 mln bbl in place.

42. Back in 1980 daily crude oil production from the Congo was about 52,000 bbl. In 1984 the Congo produced 6.0 million tons of oil and export figure for 1983 reached 4.8 million tons.

They reported in May 1984 the production peak of 126,000 bbl per day in Congo.

43. Estimated recoverable reserves in Congo by 1984 exceeded 410 MMBBLS and are located almost entirely offshore. It was calculated by Petroconsultants (Geneva) that three-quarters of discovered oil has yet to be extracted and lifespan was put at about 16 years. In the largest oil field Emeraude there is possibility to enhance recoverable reserves provided secondary recovery methods prove to be a success.

44. Gas production in Congo is minor due to a lack of local market for this commodity. At present there are 8 fields proved reserves of which are estimated around 14 billion cubic meters.

45. A 60-mile, 18-in crude oil line run from Loango to Djerro terminal, near Point Indienne. There is only one refinery in Pointe Noire with a capacity of up to 1.2 million tons.

III EVALUATION OF EXPLORATION EFFORTS AND PETROLEUM POLICY ISSUES

(a) East Africa

46. This study indicates that Eastern African countries have not been carring out the amount of exploration that would be justified by their geological potential.

47. In a discussion of the petroleum prospects in East African subregion several fundamental geologic issues assume major importance. The first question to be answered by petroleum geologists: has oil or natural gas been generated in the area and are there suitable reservoir rocks ? and the second question to ask is concerning the presence of suitable structures in the subregion. If for the first question the answer is firm and positive the second one may be answered with some reservation as far as sedimentary basins in Eastern Africa are concerned.

48. The exploration efforts in Eastern Africa are far from being adequate to ensure the ultimate discovery of commercial accumulations of oil. In the Red sea basin area which covers 370,000 sq. km., only 27 wells have been drilled so far and in the East African basin comprising 2.0 mln. sq. km. of land and off-shore, 120 exploratory wells only penetrated the thick sequence of sedimentary rocks.

49. The evaluation of Eastern Africa's potential indicated that there is a target for future exploration efforts here. The appraisals given in this paper are derived primarily from regional geological considerations, and, as in any dynamic process, are subject to considerable change with time and application of new geologic data and technique.

50. Lack of finance and trained personnel could be named among a few bottlenecks which plague the development of petroleum resources in Eastern African member States. Studies undertaken by the ECA secretariat have identified several common deterrents to exploration programmes in subregion. These include:

(i) The wrong perception of the geological prospectivity of the subregion based on recent discoveries of exclusively gas-prone areas;

(ii) Inability of the major oil companies to overcome the legislative and contractual constraints which limit access to acreage or the right to export petroleum, or failure to provide adequate financial incentives;

(iii) Unstable economic and political conditions;

(iv) Financial and organizational weakness of the state-owned oil companies even in larger East African countries with a well established petroleum sector.

(b) Southern Africa

51. In Mozambican basin only 75 wells have been drilled and the surface area of the basin both on land and offshore is about 720,000 sq. km. In this sub-region the problems of petroleum exploration and exploitation vary widely from country to country.

52. Two countries, namely Tanzania and Mozambique, reached the stage of promotion and have achieved some positive results. Two projects have resulted in discoveries, mostly gas, which would justify commercial development and have contributed to renewing the interest of international oil companies in this area.

53. In Angola oil stands out as the exeptional opportunity. For instance in the southern offshore there are still several blocks open for bidding. New acreage has recently been acquired by B.P., Elf and others in a race for position - in what is emerging as a major growth industry.

54. Increasingly, the non-Cabinda produced oil is becoming more significant. However the joint venture of Gulf and Sonangol in Cabinda may quickly raise production level to around 200,000 b/d by the end of the next year. It is expected that by that time Angola should be producing about 365,000 b/d.

(c) Central Africa

55. Congo continues to exhibit a high and non-diminishing reliance on oil as a commercial energy source. Equally this is true in case of the economic development, income and investment expenditures. In 1982 investment expenditure was at a level six times higher than the average of the previous five years, a reflection of greatly increased petroleum exports and increased borrowing under a very ambitious five-year plan. However, since the beginning of 1983, the government has undertaken to make deep cuts in the programme as official reestimates, made in early 1983, showed that oil revenues for the year may be 40 per cent lower than had been originally forecast.

56. Cameroon, situated in-between Africa's two OPEC members, followed an output expansion approach to petroleum production and the country rely heavily on oil exports and revenues.

57. Cameroon, the newest oil exporter in the subregion, continued to grow rapidly, with GDP probably increasing by more than 7 per cent in 1982. Twenty-five years ago Cameroon was a low-income country overwhelmingly dependent on coffee and cocoa as sources of foreign exchange earnings. Now with one of the highest incomes in the region (about US$ 880 per capita in 1981), more diversified exports, and increased credit worthiness, Cameroon has graduated as a borrower from IDA to become eligible for IBRD borrowing.

58. Cameroon's Government percives the medium-term problem as one of the opportunities and perils that accompany large oil exports. The Government has had a measure of success in avoiding the all-too-frequent consequences of a booming oil sector, which produces abundant foreign exchange and fiscal resources: athrophy of other-commodity- producing activities, particularly agriculture, as food imports become easily available and agricultural exports less critical.

59. However the real growth of GDP over 1983-84 was 2-3 per cent and inflation reached 15-20 per cent. There is a strongly growing oil reliance in Cameroon which call for the intensive exploration effort. If previously Cameroon's economy was independent on oil and its economic structure was balanced (unlike in Nigeria), nowadays the picture is gradually shifting and perhaps inexorably.

(d) Petroleum policy issues in Subregions

60. The oil industry analysts say that the organization of Petroleum Exporting Countries (OPEC) have now clearly lost its influence on the world oil market and they predict that the organization is unlikely to regain the former status before 1990.

61. This factor has an important effect on the level of petroleum exploration, exploitation and production in Africa for two main reasons. First, the glut of oil and the restrictions imposed by OPEC on the assumption that the glut will last a long time has discouraged exploration programmes. Second, the relatively depressed state of oil markets has adversely affected oil companies earnings and they have had to trim their costs drastically.

62. The present lull and relative lack of interest in petroleum activity in Africa is unlikely to last long. The majority of short-term forecasts show that demand for oil will rise slowly over next five years 1985-1990 between 1.8 and 2.3 per cent per annum.

63. If this senario is correct, there is little doubt that oil companies will once again, begin to intensify their efforts in Africa. In the meantime, there are a number of things that can be done by African governments to quicken the pace of exploration, exploitation and development of oil fields.

64. In order to reduce dependence on import of oil nonproducing African countries should develop more prospecting and exploration of oil and natural gas for which large scale investment is necessary. Some member States leave the exploration for hydrocarbons to foreign companies or to public national companies. While exploration by private industry tends to be directed towards early economic rewards the nationally owned or parastatal enterprises may accept a long-term comprehensive programme of studies.

65. There is a possibility that exploration efforts in some African countries could result in the discovery of a number of small oil and gas fields over a short period of time. From a commercial stand point it may not be always in the interest of private companies to proceed immediately with the development of these discoveries as they are made. The African governments may have a different view and in appropriate cases should proceed with development of small oil and gas fields for domestic consumption only.

IV. CONCLUSION

66. In the last few years petroleum development in Africa have had to be curbed as part of a scaling down of public expenditure and in order to ensure that balance of payment is not jeoparadized. If the national objectives of highest priority such as energy development are to be realized in member States some of these difficulties will need to be overcome.

67. Since African countries will continue to depend on imported oil for sometime to come it is worthwhile therefore to intensify the search for hydrocarbons. Additionally, conservation measures should be stepped up in order to reduce the foreign currency requirements for oil importation.

68. The medium-term plan have been drafted by the ECA secretariat to expedite the developments in the petroleum sector in East, Southern and Central African member States. According to this plan all possible efforts should be made for increased exploration activities and the development of hydrocarbon resources, natural gas in particular. Efforts in this area should include:

(i) intensification of geological and geophysical exploration in all countries of East, South and Central African subregions;

(ii) evaluation of known hydrocarbon resources and their recoverable portion;

(iii) development and utilization of natural gas resources already identified;

(iv) establishment of the machinery for co-ordination of activities and formulation of policies for national development and utilization of hydrocarbons.

69. The energy future of the countries in East, Southern and Central African subregions will depend to a large extent on their ability to develop their hydrocarbon resources. The programme of co-operation in the field of hydrocarbon development is imperative, which may lead to the identification, selection and realization of the projects of national and subregional interest. This could be the right times for concentrated positive action of the member States in these subregions who can always rely on technical support of the ECA secretariat in the implementation of the national and subregional programmes of hydrocarbon exploration, exploitation and development.